Reco Workshop,
Detector Effect Study

10/2/14

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Reco Group

Selecting Showers/ Distinguising e/γ

3 things we can study:

- Fiducial Volume

- Shower Length

- Distance between Start Point and Vertex

Selecting Showers/ Distinguising e/γ

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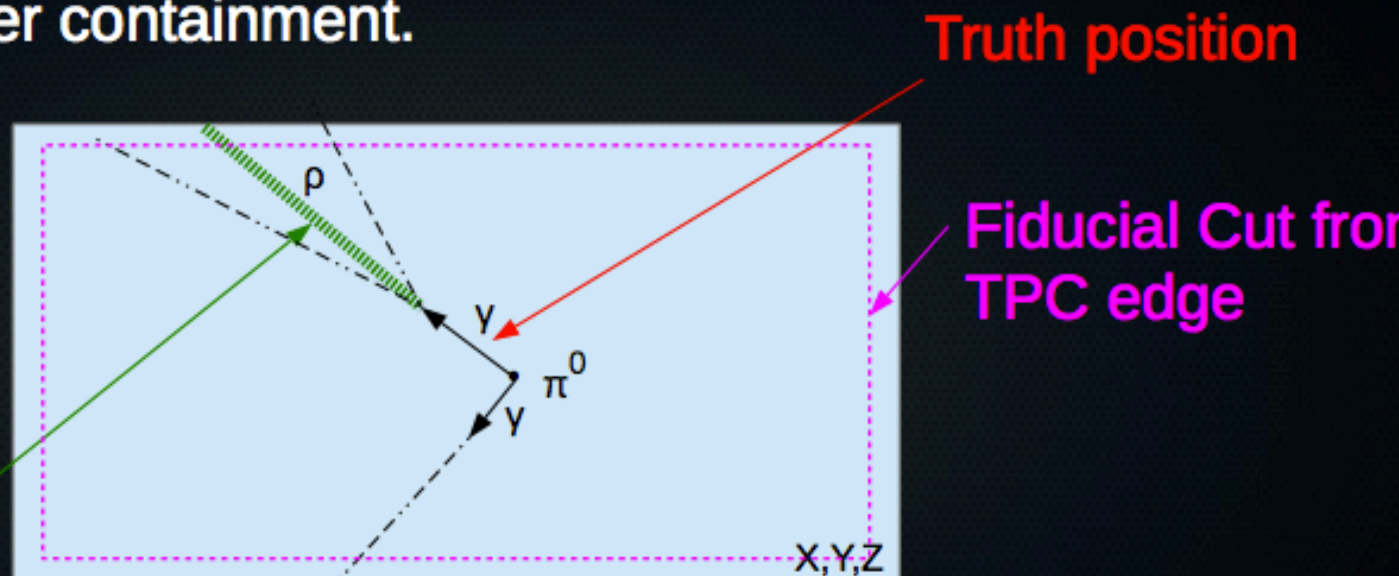
- Fiducial Volume

- Shower Length

- Distance between Start Point and Vertex

Previously

Ryan's study, DocDB 3687 involved fiducial cut, and shower distance from edge of detector
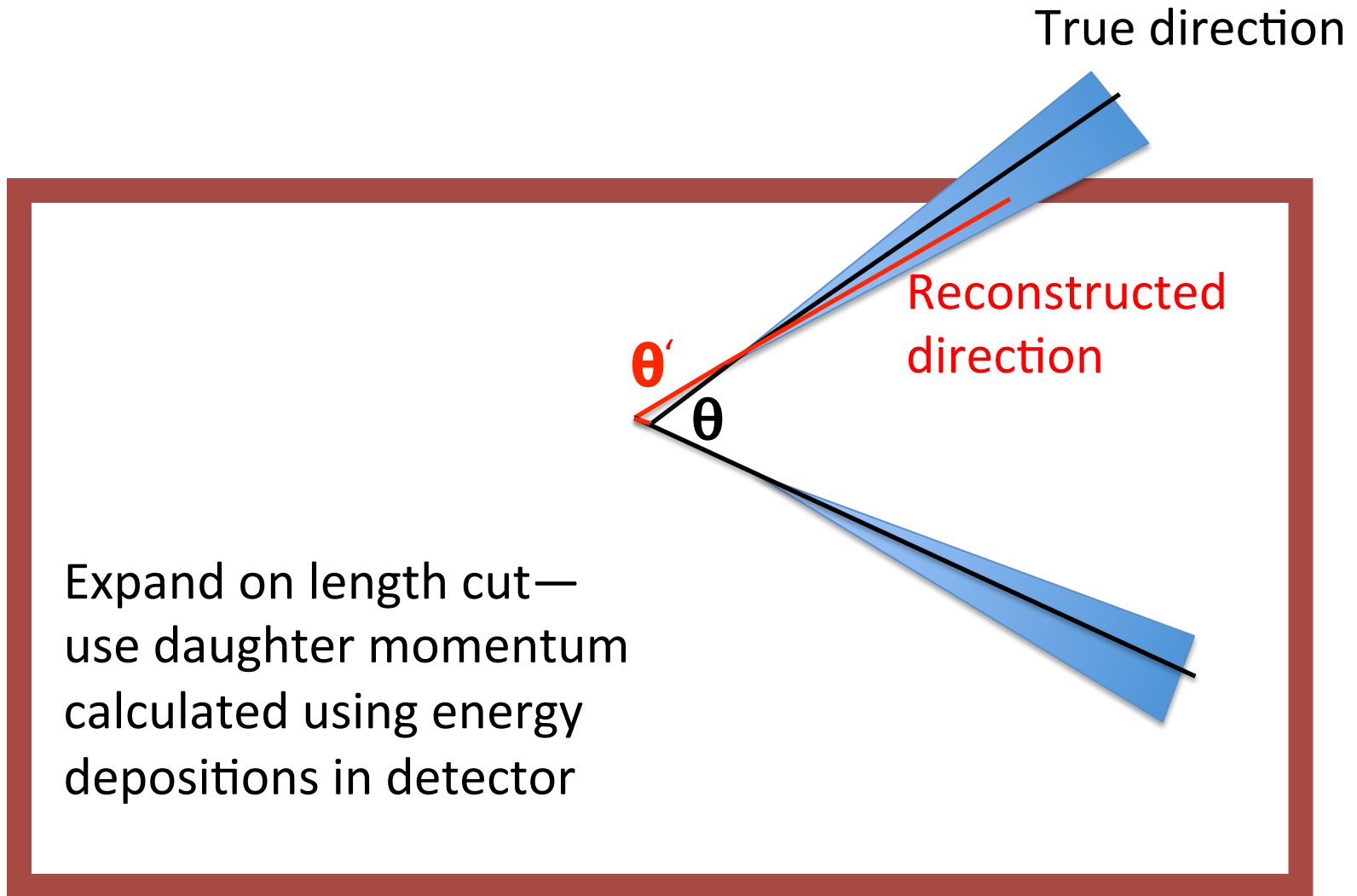

Shower Containment

- Estimate shower containment.

Truth position

Fiducial Cut from TPC edge

X,Y,Z

P = Distance from γ conversion to closest projected edge of TPC

Detector Effect

True direction

Detector Effect

True direction

Reconstructed direction

θ'

θ

Expand on length cut—
use daughter momentum
calculated using energy
depositions in detector

Efficiency

Efficiency is defined as :

#showers that pass a cut / #total showers

For example, the number of contained showers decreases as we increase a cut on fiducial volume; efficiency decreases.

Energy Containment

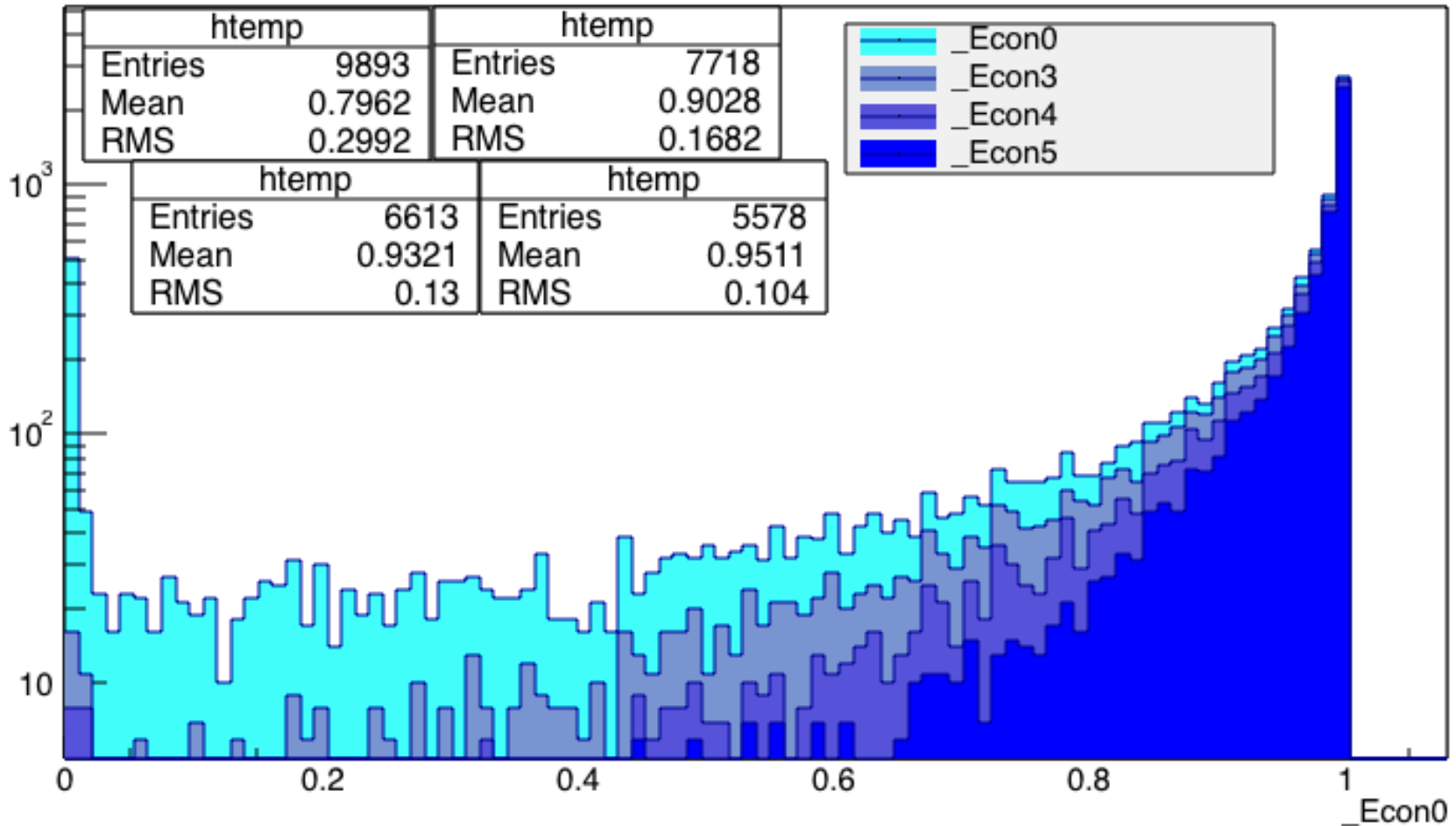Energy containment is defined as :

daughter energy / mother energy

Mother energy is energy of particle produced at the vertex.

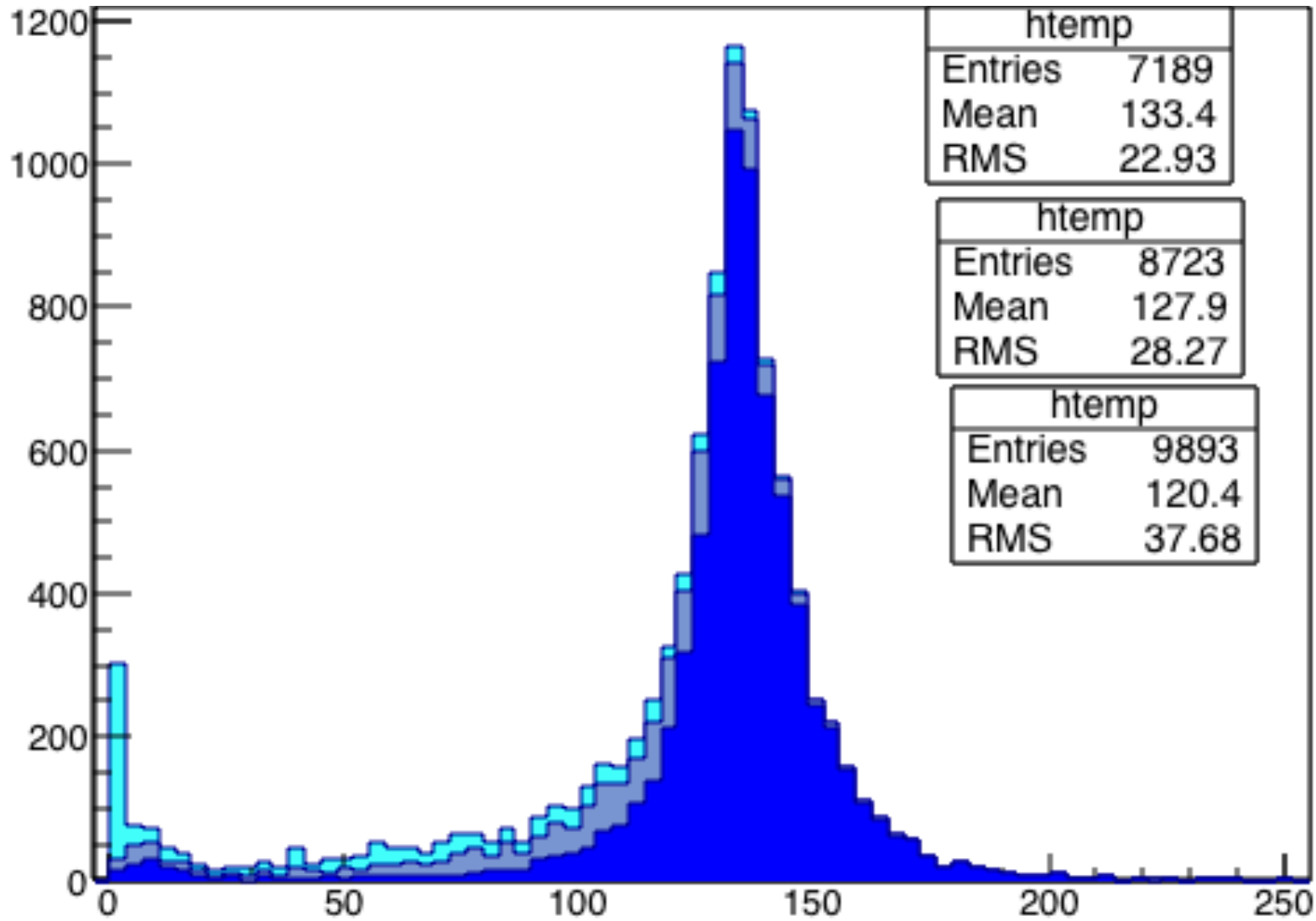Daughter energy is energy of the shower (after conversion)deposited in the detector.

Energy Containment

(legend refers to no cut, and 3,4,5 rad lengths cut from vertex)

_Econ0

htemp	
Entries	9893
Mean	0.7962
RMS	0.2992

htemp	
Entries	7718
Mean	0.9028
RMS	0.1682

htemp	
Entries	6613
Mean	0.9321
RMS	0.13

htemp	
Entries	5578
Mean	0.9511
RMS	0.104

Legend: _Econ0, _Econ3, _Econ4, _Econ5

PiO Mass Peak

htemp	
Entries	7189
Mean	133.4
RMS	22.93

htemp	
Entries	8723
Mean	127.9
RMS	28.27

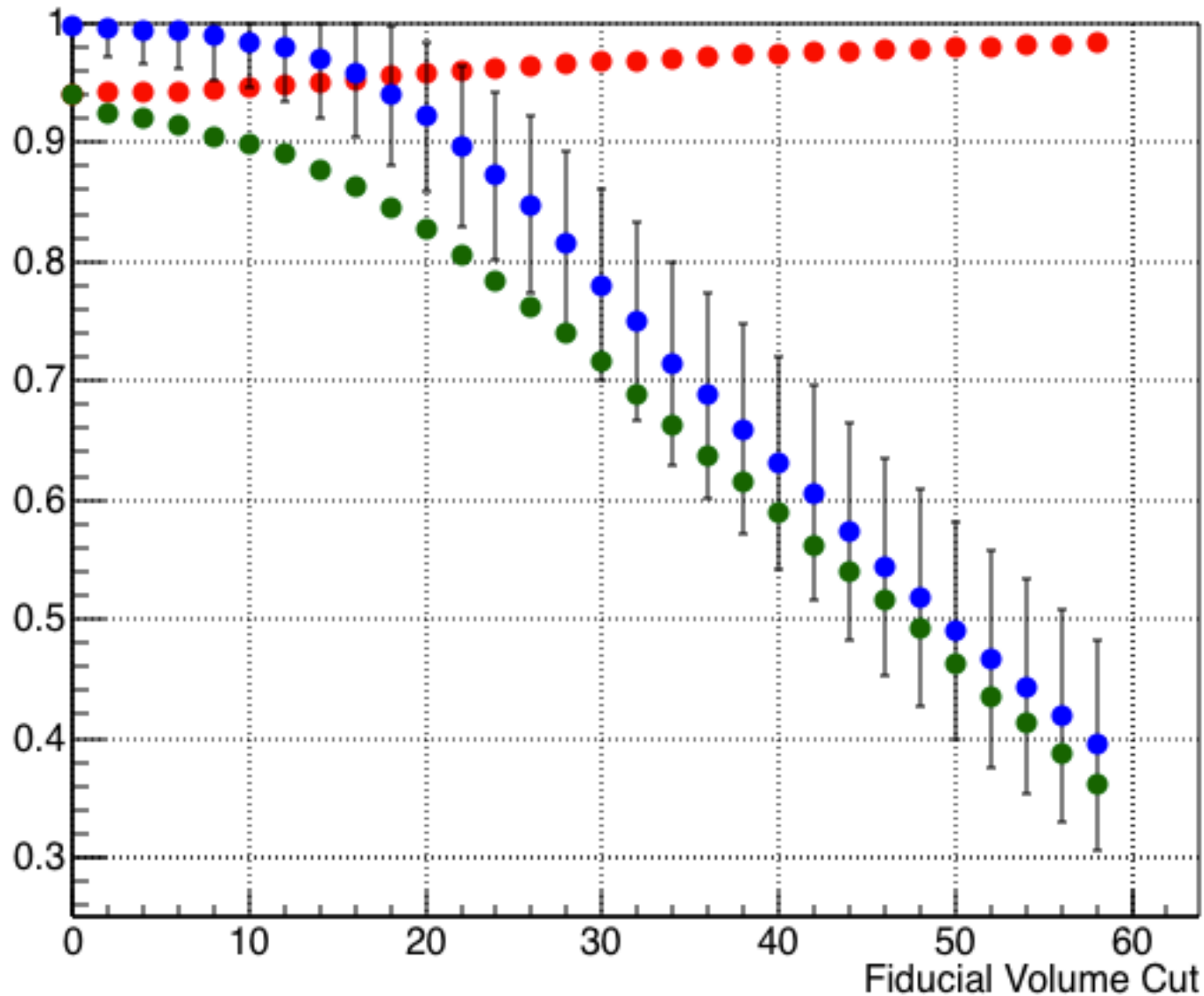| htemp	
Entries	9893
Mean	120.4
RMS	37.68

5Rad Len
3Rad Len
0Rad Len
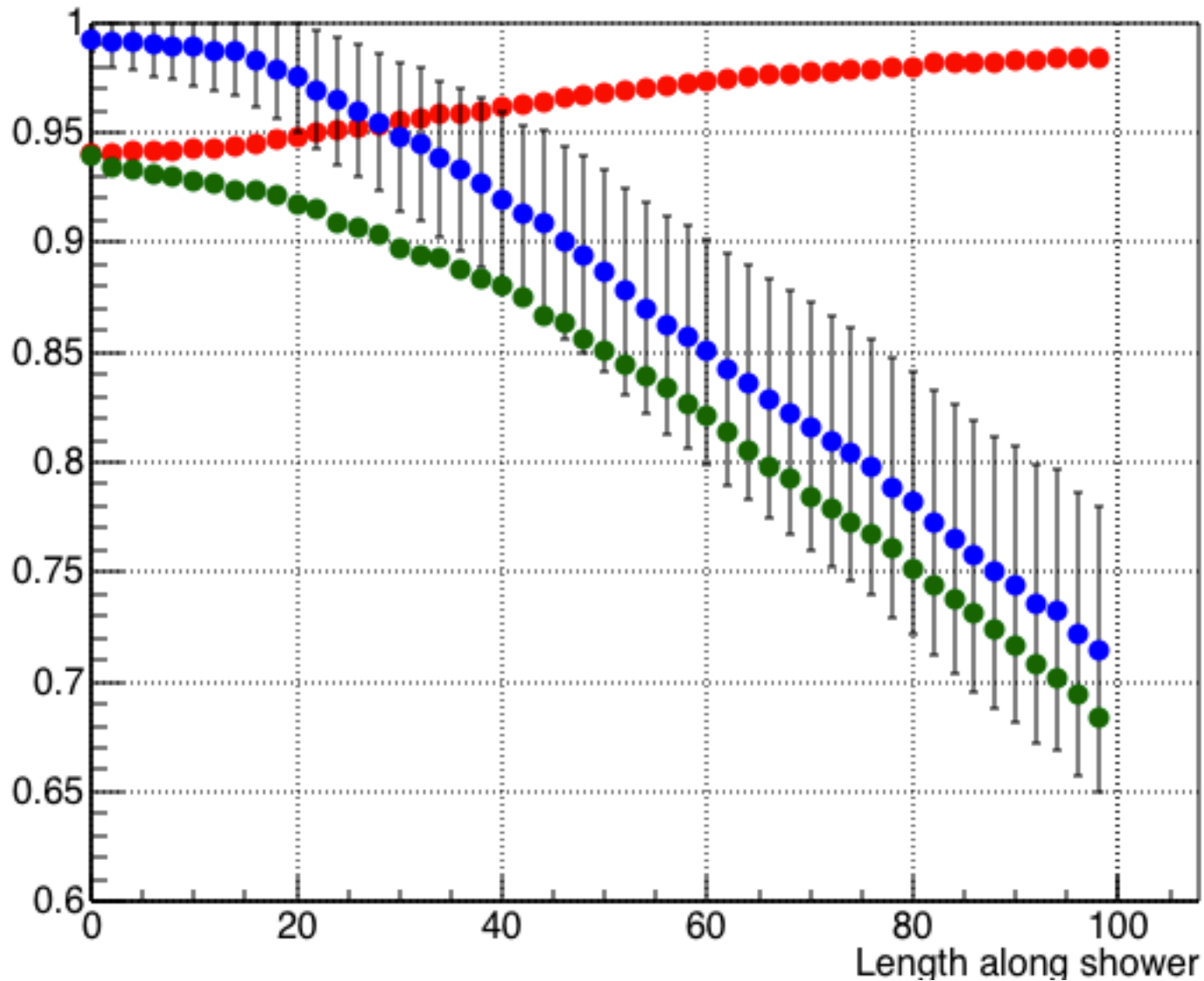
Efficiency, EnergyContainment and Convolution vs Fiducial Cut

Single
Showers

EC
Efficiency
Convolved

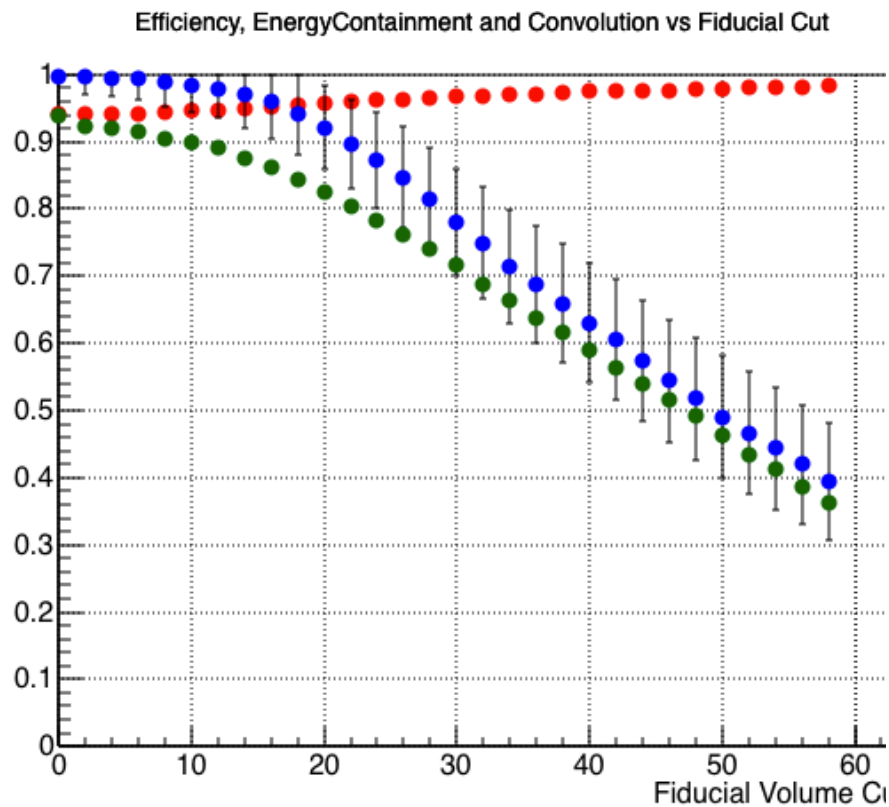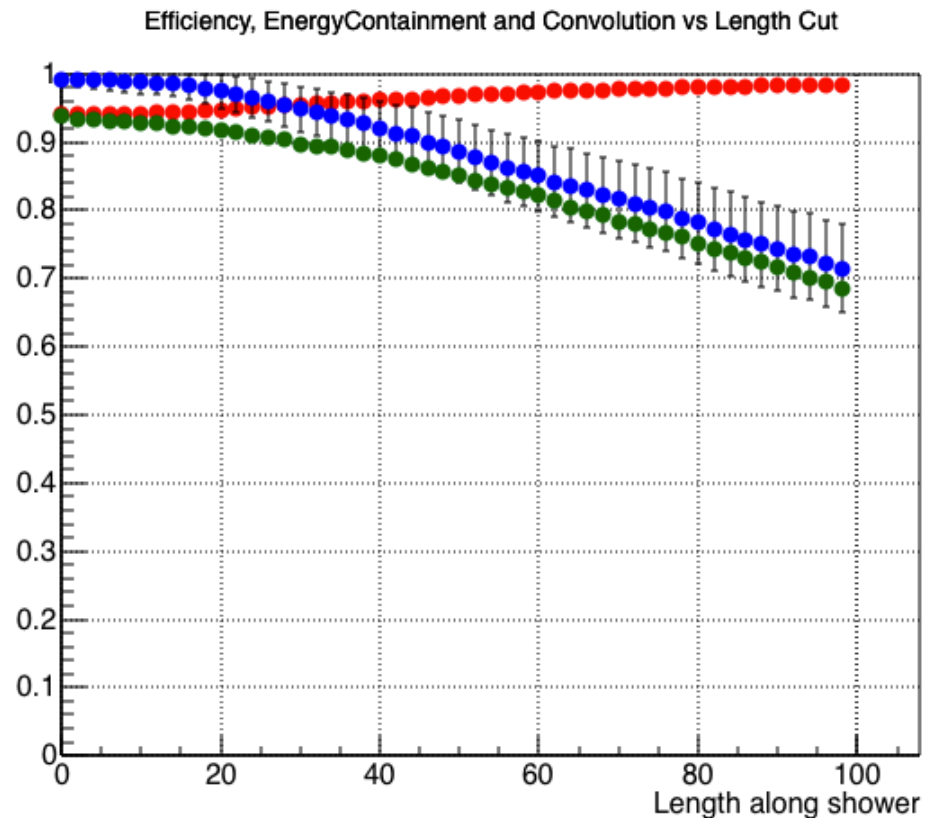Efficiency, EnergyContainment and Convolution vs Length Cut

Single Showers

EC
Efficiency
Convolved

Length along shower

Both for comparison, slightly different scale

Fiducial Cut

Efficiency, EnergyContainment and Convolution vs Fiducial Cut

Length Cut

Efficiency, EnergyContainment and Convolution vs Length Cut

Energy Containment*Eff vs. Fid. vs. Length